

DIAMOND GRINDING AND SURFACE TESTING BRIDGE SECTIONS

Effective: December 6, 2004

Revised: **January 3, 2014**

Description. This work shall consist of diamond grinding and surface testing bridge sections.

A bridge section shall consist of the bridge deck plus the bridge approach pavement and connector pavement on each side of the bridge.

Equipment. Equipment shall be according to the following.

- (a) Diamond Grinder. The diamond grinder shall be a self-propelled planing machine specifically designed for diamond saw grinding. It shall be capable of accurately and automatically establishing the profile grade and shall have a positive means for controlling cross slope. It shall also have an effective means for removing excess material and slurry from the surface and for preventing dust from escaping into the air. The diamond grinder shall not cause strain or damage to the surface.

The grinding head shall be a minimum of 4 ft. (1.2 m) wide and the diamond saw blades shall be gang mounted on the grinding head at a rate of 50 blades / ft. (164 blades/m).

- (b) Surface Testing Equipment. Required surface testing and analysis equipment and their jobsite transportation shall be provided by the Contractor.

- (1) Profile Testing Device. The Profile Testing Device shall have a decal displayed to indicate it has been tested through the PEV Program administered by the Department.

- a. California Profilograph. The California Profilograph shall be either computerized or manual and have a frame 25 ft (8 m) in length supported upon multiple wheels at either end. The profile shall be recorded from the vertical movement of a wheel attached to the frame at mid point.

The California Profilograph shall be calibrated according to the manufacturer's recommendations and California Test 526. All calibration traces and calculations shall be submitted to the Engineer for the project file.

- b. Inertial Profiler. The inertial profiler shall be either an independent device or a system that can be attached to another vehicle using one or two non-contact sensors to measure the pavement profile. The inertial profiler shall be capable of performing a simulation of the California Profilograph to provide results in the Profile Index format.

The inertial profiler shall be calibrated according to the manufacturer's recommendations. All calibration traces and calculations shall be submitted to the Engineer for the project file.

- (3) Trace Analysis. The Contractor shall reduce/evaluate these traces using a 0.00 in. (0.0 mm) blanking band and determine a Profile Index in in./mile (mm/km) for each bridge section. Traces produced using a computerized profile testing device will be evaluated without further reduction. When using a manual profile testing device, the Contractor shall provide an electronic scanner, a computer, and software to reduce the trace. All analysis equipment (electronic scanner, computerized recorder, etc.) shall be able to accept 0.00 in. (0.0 mm) for the blanking band.

All traces from bridge sections tested with the profile testing device shall be recorded on paper with scales of 300:1 longitudinally and 1:1 vertically. Equipment and software settings of the profile testing device and analysis equipment shall be set to those values approved through the PEV Program."

CONSTRUCTION REQUIREMENTS

General. After all components have been properly cured, the bridge section shall be ground over its entire length and over a width that extends to within 2 ft. (600 mm) of the curbs or parapets. The maximum thickness removed shall be 1/4 in. (6 mm); however, when the bridge deck thickness noted on the plans can be maintained, as a minimum, additional removal thickness may be permitted.

The vertical difference between longitudinal passes shall be 1/8 in. (3 mm) maximum. The grinding at the ends of the bridge section shall be diminished uniformly at a rate of 1:240 over the connector pavements.

Grinding shall be continuous through all joints. When sealed joints are specified, grinding shall be completed prior to final installation of the joints seals. During grinding, joint openings shall be temporarily filled with material approved by the Engineer.

Surface Testing. The diamond ground bridge section shall be surface tested in the presence of the Engineer prior to opening to traffic. All objects and debris shall be removed from the surface prior to testing. During surface testing, joint openings may be temporarily filled with material approved by the Engineer.

Profiles shall be taken in the wheel paths of each lane, 3 ft. (1 m) from and parallel to the planned lane lines. A guide shall be used to maintain the required distance.

The profile trace shall be printed on continuous paper with scales of 300:1 horizontally and 1:1 vertically and shall have stationing indicated every 500 ft. (150 m) at a minimum. Both ends of the profile trace shall be labeled with the following information: contract number, beginning and ending stationing, which direction is up on the trace, which direction the profilograph was pushed, and profilograph operator name(s). The top portion of the Profilograph Report of Bridge Smoothness (Attachment 1) shall be completed and the form secured around the trace roll.

Trace Reduction and Bump Locating Procedure. All traces shall be reduced. Traces produced by a mechanical recorder shall be reduced using an electronic scanner and computer software. This software shall calculate the profile index and indicate any bumps in excess of 0.30 in. (8 mm) with a line intersecting the profile on the printout. Computerized recorders shall provide the same information.

The average profile index and locations with deviations exceeding the 0.30 in. (8 mm) limit shall be recorded on the Profilograph Report of Bridge Smoothness as shown in Attachment 1.

All traces and completed reports shall be provided within two working days of completing the testing to the Engineer for the project file. Traces from either a computerized profile testing device or analysis software used with a manual profile testing device shall display the settings used for the data reduction. The Engineer will compare these settings with the approved settings from the PEV Program. If the settings do not match, the results will be rejected and the section shall be retested/reanalyzed with the appropriate settings.

Corrective Actions. Within the bridge section, all deviations in excess of 0.30 in. (8 mm) in a length of 25 ft. (8 m) or less shall be corrected regardless of the profile index value. Correction of deviations shall not result in the deck thickness being less than the minimum.

Any bridge section having an average profile index greater than 35.0 in./mile (555 mm/km), including bumps, shall be corrected to reduce the profile index to 35.0 in./mile (555 mm/km) or less on each trace.

Where corrective work is performed, the bridge section shall be retested to verify that corrections have produced a profile index of 35.0 in./mile (555 mm/km) or less for each trace.

Corrective actions shall be performed at no additional cost to the department. The Contractor shall furnish the surface profilograph tracing and the completed form to the Engineer within two working days after any corrections are made.

The Engineer may perform profilograph testing on the surface at any time for monitoring and comparison purposes.

Smoothness Assessments. Smoothness assessments will be based on the final average profile index determined for the bridge section after performing any corrective work. Additional payments/deductions will be as indicated in the Smoothness Assessment Schedule.

The Smoothness Assessment Work Sheet (Attachment 2) will be completed by the Engineer for payment.

SMOOTHNESS ASSESSMENT SCHEDULE

Profile Index in./mile (mm/km) per Bridge Section	Smoothness Assessment per Bridge Section
15.0 (240) or less	+\$7,500.00
>15.0 (240) to 18.0 (285)	+\$5,000.00
>18.0 (285) to 20.0 (315)	+\$2,500.00
>20.0 (315) to 35.0 (555)	+\$0.00
>35.0 (555) to 45.0 (710)	+\$0.00
>45.0 (710)	-\$5,000.00

Method of Measurement. This work will be measured for payment in place and the area computed in square yards (square meters) of diamond grinding performed.

Basis of Payment. This work will be paid for at the contract unit price per square yard (square meter) for DIAMOND GRINDING (BRIDGE SECTION).

**INSTRUCTIONS FOR COMPLETING
PROFILOGRAPH REPORT OF BRIDGE SMOOTHNESS**

This form shall be prepared and submitted, along with the profile trace, to the Engineer.

The Type of Report is one of the following:

Information – Test conducted for informational purposes only.

Initial – Testing of bridge section prior to any corrective action.

Intermediate – After some corrective action has been completed.

Final – After all corrective action has been completed.

Other Information:

Structure Number – Numerical identification of the bridge.

Traffic Direction – NB, SB, EB, or WB depending on the design traffic flow of the numbered route.

Lane Designation – DL (Driving Lane), CL (Center Lane), or PL (Passing Lane).

Operator – Printed name of Contractor personnel operating profilograph.

Engineer – Printed name of Department representative witnessing data collection.

Bump locations are listed by station for each track (wheel path).

EXAMPLE

PROFILOGRAPH REPORT FOR BRIDGE SMOOTHNESS

Type of Report:

☐ Information ☒ Initial ☐ Intermediate ☐ Final

Contract No. 96739

Route IL 255

Contractor John Doe Construction Co.

Section No. _____

Station 1795+06.0

County Madison

No. of Lanes 2

Structure Number 060-1234

Operator Joe Smith

Traffic Direction EB

Engineer Mike Jones

Date Tested 09/02/99

Section No.	Length mile (km)	Track 1 Measured Roughness in. (mm)	Track 1 Profile Index in./mile (mm/km)	Track 2 Measured Roughness in. (mm)	Track 2 Profile Index in./mile (mm/km)	Average Profile Index in./mile (mm/km)
1	0.100	2.16	21.6	1.30	13.0	17.3
2	0.100	2.18	21.8	2.26	22.6	22.2

Bump Locations: Track 1: 1893+53.5

Certified by: _____

Title: Chief Profilograph Pusher

Organization: John Doe Construction Co.

ATTACHMENT 1

PROFILOGRAPH REPORT FOR BRIDGE SMOOTHNESS

Type of Report:

____ Information ____ Initial ____ Intermediate ____ Final

Contract No. _____

Route _____

Contractor _____

Section No. _____

Station _____

County _____

No. of Lanes _____

Structure Number _____

Operator _____

Traffic Direction _____

Engineer _____

Date Tested _____

Section No.	Length mile (km)	Track 1 Measured Roughness in. (mm)	Track 1 Profile Index in./mile (mm/km)	Track 2 Measured Roughness in. (mm)	Track 2 Profile Index in./mile (mm/km)	Average Profile Index in./mile (mm/km)

Bump Locations: _____

Certified by: _____

Title: _____

Organization: _____

ATTACHMENT 2

SMOOTHNESS ASSESSMENT WORK SHEET

Contract No. _____ Section _____

Route _____ County _____

Section Number	Structure Number	Final Profile Index	Smoothness Assessment (+ or -)	Accumulated Assessment (+ or -)	Remarks/Final Profile
Final Assessment					

Computed by: _____ Checked by: _____

Approved by: _____